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REMARKS

Claims 2, 5-10, 15-25, 51, 56, and 57 are pending in the present Application. Claim 56 has been cancelled, Claims 8, 21, and 25 have been amended, and Claims 58 – 67 have been added, leaving Claims 2, 5-10, 15-25, 51, and 57 – 67 for consideration upon entry of the present Amendment

Claim 8 was merely amended to correct a typographical error; namely to change ",," to ",".

Claim 25 has been rewritten such that the claim now contains the intended meaning of the last amendment. More particularly, this claim has been amended to include an antecedent to clarify an element of the claim.

Claim 56 has been amended to more distinctly claim the invention and to further vary the claims.

Claims 58 – 67 have been added to further claim the present invention. Support for these claims can at least be found in Claim 25 as originally filed.

The Specification has been amended for consistency with the claims. Support for this amendment can at least be found in Claim 20 as originally filed.

No new matter has been introduced by these amendments. Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

Claim Rejections Under 35 U.S.C. § 112, Second Paragraph

Claim 25 stands rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular,

> Claim 25 recites "wherein each of the porous supports is integrated with an elastomeric material selected from the group consisting of copper....

(Office Action, Page 2)

Claim 25 has been modified to include the antecedent "electrically conductive particulate materials," to the group consisting of copper... Applicants believe the amended claim points out

and distinctly claims the subject matter which Applicants regard as the invention. Therefore, reconsideration and withdrawal of this rejection are respectfully requested.

Claim Rejections Under 35 U.S.C. § 103(a)

Claim 56 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over WO 97/13287 to Mussell et al. in view of WO 00/39363 to Speranza et al. Claim 56 has been cancelled, thereby rendering this rejection moot.

Claims 2, 5-10, 18-21, and 57 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 6,030,718 to Fuglevand et al. in view of U.S. Patent 5,641,586 to Wilson, and International Publication WO 00/39363 to Speranza et al. Applicants respectfully traverse this rejection.

The Examiner relies upon Fuglevand et al. to teach:

> A fuel cell comprising first and second electrodes (160), an electrolyte membrane (151), first and second flow fields, and porous flow members (171, 172) in fluid communication with flow fields (see Fig. 26). The member comprises a porous support having a series of layers (in layer 171) having a hydrophilicity gradient (see col. 11, line 8). Layer 171 comprises particulate carbon and a hydrophobic polymer (e.g., PTFE) and/or a hydrophilic polymer (e.g., ionomer) and layer 172 comprises a carbon cloth integrated with polymer (see col. 9, line 42, col. 0 line 52, col 10, line 66). Layer 171 comprises 20-90% of support material (i.e., particulate carbon).

As noted in the Office Action, Fuglevand's porous layer is 20 – 90 wt% particulate carbon. Fuglevand et al. do not teach that the porous supports comprise metal screens or metal cloths, or that such supports can be made of Nb, Zr, Ta, Ti, steel, Ni, Co, and mixtures and alloys thereof.

Examiner relies on Wilson to teach a fuel cell with a porous support comprising sintered particles, woven metal screens, and non-woven metal screens. Examiner further relies on Speranza to teach a screen or frame made from Nb, Ni, Co, Zr, Ti, or steel.

Fuglevand at least does not teach a porous support that is a screen, a perforated sheet, a pierced sheet, a sintered metal cloth, an etched sheet, a felt, or a woven mesh, and fail to teach the porous support comprising a material selected from the group consisting of niobium, zirconium, tantalum, titanium, nickel, cobalt, steel, and alloys comprising at least one of the

foregoing materials. The Examiner claims an artisan would be motivated to "use the structures of Wilson '586 in the fuel cell of Fuglevand" and use "materials of Speranza et al. in the flow field members of Wilson. The motivation for combining is allegedly that the metal screens and cloths are functionally equivalent to carbon cloths. (OA, Page 5)

Obviousness is not based upon what an artisan can do, but what an artisan would be motivated to do, with an expectation of success. Fuglevand et al. specifically teach

> the first diffusion layer 171 which is affixed thereto comprises a coating of particulate carbon suspended in a binding resin. Further, the second diffusion layer 172 comprises preferably a porous hydrophobic carbon backing layer.

(Col. 9, lines 40 – 45) There is no motivation or expectation of success that using a different material will function as desired under the operating conditions of the fuel cell.

Wilson is relied upon to allegedly teach that "metal screens and cloths are functionally equivalent to carbon cloths...". (OA, Page 5) Actually, Wilson teach that

> U.S. Pat. No. 4,129,685 to Damiano teaches the use of a thick layer of carbon foam to serve as a porous flow-field in a phosphoric acid fuel cell and, in one embodiment, in contact with a layer having relatively smaller pore sizes to prevent penetration of the catalyst into the pores. But there is no teaching about combining such a flow-field with a gas diffusion barrier or about the effects of water accumulation on the macroporous flow-field. The structures described herein typically form the macroporous flow-field from resin bonded carbon paper available, e.g., from Toray (Japan) or Spectracorp. This material is about 70% porosity, 30 μm mean pore diameter, of various thicknesses. Other possible porous structures include carbon or metal foams, sintered particles, and woven or non-woven metal screens.

(Col. 4, line 65 – Col. 5, line 12) In other words, Wilson does not state that carbon cloth and metal screens are functionally equivalent. Wilson teaches that different designs have different properties. They mention other possible porous structures, but do not elaborate on how these structures are used. Additionally, Wilson teach that they use carbon paper; "structures described herein typically form the macroporous flow-field from resin bonded carbon paper...".

Each particular design is intended to enhance the efficiency, ease of assembly, life, etc., of the electrochemical cell and/or of a particular component. There is no motivation to ignore the specific teachings of each reference, e.g., of Fuglevand et al. or of Wilson, in consideration for a teaching in the other reference. For instance, there is no motivation to assume that a comment by

Wilson that other materials may be used by Wilson in some designs means that the diffusion layer of Fuglevand et al. can be modified to include metal, or that it can or should be modified to include the specific materials of Speranza et al. There is no motivation to pick and choose portions of the various references to attain the present claims. Furthermore, as noted above, Speranza et al. teach an integrated screen-frame assembly. If there is any motivation, it is to integrate the frame, not to ignore the materials choices of Fuglevand et al.

Regarding Claim 9, the Examiner has failed to prove a *prima facie* case that any of the references teach or suggest that the "polymer is an elastomer, and the elastomer is threaded, woven, or stitched within the porous support".

With respect to Claim 20, the Office Action has failed to discuss the claimed limitation, namely that the porous support comprises a material that is non-oxidizable at anodic potentials of less than about 4 volts. No *prima facie* case of obviousness has been established.

Regarding Claims 18 and 19, Fuglevand et al. specifically teach "a noncatalytic electrically conductive diffusion layer 170" (Col. 9, lines 23 – 25). Since Claim 18 includes a catalyst, and Claim 19 defines particular catalysts, Fuglevand et al. specifically teach away from Claims 18 and 19. As such, one of ordinary skill in the art would not have been motivated to include a catalyst into the diffusion layer of alone or in combination et al. Hence, Fuglevand et al. fail to render Claims 18 and 19 obvious.

Reconsideration and withdrawal of this rejection are respectfully requested.

Claims 15, 22-25, and 51 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Fuglevand et al. in view of Mussell et al. Additionally, Claims 16 and 17 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Fuglevand et al. in view of Mussell et al. and Wilson. Applicants respectfully traverse these rejections.

The Examiner relies on Fuglevand et al. to teach porous flow field members having a hydrophilicity gradient. The Examiner further relies on Mussell et al. to teach flow field members having two layers of porosity. The Examiner contends that page 4, line 11 of Mussell et al teaches that:

> It has been discovered that the fuel cell of the fourth and fifth aspects of the invention as well as fuel cells prepared by the process of the sixth aspect of the invention are able to operate at high current density at relatively high voltage,

> have a relatively high power density, and provide a high power density even when operated under relatively low gas pressures.

The Examiner further contends that an artisan would be motivated by this passage of Mussell et al. to vary the porosity across the plurality of layers of Fuglevand et al, and that it would be obvious ot substitute the metal screens or sintered metal cloths of wilson for the carbon paper of Fuglevand.

Mussell et al. are directed to particular flow field structures for membrane electrode assemblies (MEA). These flow field structures are adjacent to the MEA. (Page 1, lines 3 – 4) Mussell et al. are directed particularly to the flow field and state that it is a layer of electrically conductive porous material and it may comprise porous carbon material. (Page 5, lines 18 – 23) Suitable examples of porous carbon materials are provided as including carbon paper, graphite paper, carbon felts, or other carbon-based compositions. (Page 5, lines 32 – 35)

Fuglevand et al. specifically teach

> the first diffusion layer 171 which is affixed thereto comprises a coating of particulate carbon suspended in a binding resin. Further, the second diffusion layer 172 comprises preferably a porous hydrophobic carbon backing layer.

(Col. 9, lines 40 – 45) There is no motivation to change these specific teachings of these references. Since each reference specifically teaches a desired design, there is no motivation or expectation of success to ignore that references' teaching for a teaching of another reference. The standard is not what an artisan could do or what an artisan might do, but what an artisan would be motivated to do with an expectation of success based upon the teachings of the prior art. There is no motivation to ignore the specific teachings of the layers 171 and 172 of Fuglevand et al. and not expectation of success. Wilson does not teach that "metal screens and sintered metal cloths are the functional equivalent of carbon cloths". Merely mentioning both is not an affirmation that they are functional or practical equivalents.

Regarding Claims 16 and 17, there is no motivation to choose very particular arrangements of the layers of the porous support to be a porous support integrated with an elastomeric material and a screen (Claim 16) or to be porous support integrated with an elastomeric material and a sintered metal cloth (Claim 17). Even if the references were combined, which Applicants contend would not be proper, these particular arrangements are neither taught or suggested.

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No *prima facie* case of obviousness has been established. Reconsideration and withdrawal of these rejections are respectfully requested.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance is requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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